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The multiple system ADS 9626: A quadruple star or an encounter of two binaries?

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Abstract

© 2014, Pleiades Publishing, Ltd. The parameters of the quadruple system ADS 9626 (μ Boo) are analyzed. The system consists of two double stars: the Aa pair with an angular separation of ρ = 0.08″ and the BC pair with an angular separation of ρ = 2.2″, separated by ρ = 107″ and having the same parallaxes and proper motions. Position observations with the Pulkovo 26″ refractor have yielded from direct astrometric measurements the difference in the apparent magnitudes and the component-mass ratio for the BC subsystem: Δm = 0.59 ± 0.06, M(B)/M(C) = 1.18 ± 0.02. Spectroscopy with the Russian-Turkish 1.5-m telescope has yielded the radial velocities and physical parameters of the Aa, B, and C components. Speckle-interferometric observations with the 6-m telescope of the Special Astrophysical Observatory have provided the first measurements of the magnitude difference in the close Aa subsystem: Δm = 0.46 ± 0.03 (λ = 5500 Å) and Δm = 0.41 ± 0.03 (λ = 8000 Å). The new observations are consistent with the known orbits, which were used to find the radial velocities for the centers of mass of the inner subsystems. Themotion of the outer pair, Aa-BC, is studied using the apparent motion parameters (AMP) method. It is not possible to derive an elliptical orbit for this pair; the elements of a hyperbolic orbit have been estimated. The difference of the heavy-element abundances for the Aa and BC subsystems of 0.5 dex confirms that these pairs have a different origin. This suggests that we are observing here a close encounter of two binary stars.

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